PROJECT ON CATALYZING ENERGY CONSERVATION AT SMALL AND MEDIUM ENTERPRISES (SME) IN INDIA'S ALUMINUM DIE-CASTING INDUSTRY

FOR

PEERS PROGRAMME

TERI

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Project on Catalyzing Energy Conservation at Small and Medium Enterprises (SME) in India's Aluminum Die-Casting Industry.

Background

In India, there are over 1000 Aluminum Die casting units in small and medium [redacted]sector, geographically clustered near automobile belts of – Pune – Ahmedabad – Chakan , Punjab – Faridabad – Ghaziabad and in Tamilnadu. The Energy Efficiency level of these units is very low and as such pollute the environment excessively. Though no exact figures are available, it is estimated that the energy component is costing not less than Rs. 2000 millions (USD 51.28 million @ 1 USD = Rs. 39.00) to this sector The country is producing about 7 million tons of aluminum die-casted products annually, while the production capacity is about 22 million tons

Primary sources of energy used in the aluminum die casting units are fuel oils (FO, LSHS & LDO) and electricity. The energy is required for heating aluminum for die-casting and lighting. The energy bill accounts for the major component of the total manufacturing cost in this industry.

Petroleum Conservation Research Association (PCRA) has carried out energy use studies in aluminum die casting units. In course of the studies, it has been observed that energy efficiency levels of these units are very low

The energy use studies have revealed an energy saving potential of 10% - 14 % that can be realized through simple energy management practices with least cost options. Further, the studies have identified an additional saving potential of 20-25 %, if these units upgrade their technologies, modernize the furnaces and utilize the waste heat properly. Energy audits and subsequent consumer meets organized by PCRA in small & medium sector aluminum die casting units have revealed that

a) There is a substantial scope for reduction of Specific Fuel Consumption (SFC) in these units.

b) There is a dearth of technical expertise and lack of knowledge with regard to availability of efficient technology & scope for reduction of the energy bills in these units.

c) Since these units are placed in small & medium sector industries, these units on their own are not able to initiate technology upgradation projects.

d) There is an urgent need for further systematic examination in these units along with making necessary recommendations for least cost technology options, which are commercially viable.

Moreover, as these units form part of an unorganized sector, there is an urgent need for a nodal agency to coordinate the effort to bring about a technology upgradation project. PCRA works on behalf of Ministry of Petroleum & Natural Gas, Government of India with a mandate to develop and deploy fuel efficient and green technologies and based on it's experience can act as a catalyzing agency to improve efficient utilization of energy and reduce GHG emissions in these units.

Objectives

In line with the Operational Program # 6 & 7 of the GEF Operational Strategy - Removing barriers to energy conservation and energy efficiency and reducing the long term costs of low green house gas emitting energy technologies respectively, the objectives of the proposed feasibility study in small & medium sector aluminum die casting units are

a) Identification of barriers that inhibit adoption of energy efficient technologies

b) Identification of most suitable, least cost technology options for improving energy efficiency and GHG emission reduction for aluminum die casting units in SME's.

c) Asses per unit cost along with time required for payback if most optimal commercially viable technology is to be adopted by these units.

d) Assessment of incremental costs, as cost of removal of barriers & learning costs etc along with assessment of building endogenous capacities for sustaining the adoption of new technologies

e) Ascertain the technological and environmental baselines for these units and estimate the effects on baselines, if the project is implemented, on a time scale.

f) Identification of investment and financing options for removal of barriers for adoption of energy efficient technologies, and

g) Demonstrating & disseminating benefits of technologies and spreading awareness through seminars/ workshops

PCRA on the basis of energy use studies in the aluminum die casting units proposes to undertake technology upgradation project to realize an energy saving potential of 20-25%, which exists, if these units in SME's upgrade their technology. To achieve this overall objective, the present proposal for a Detailed Feasibility Report (DFR) which needs to be undertaken to assess the viability of the technology upgradation project.

To ensure that the proposed DFR covers all the above objectives, assessing energy efficient least cost commercially viable technology options available worldwide, will require help of international technical consultants Further, to recommend most optimal, energy efficient, commercially viable, technology suitable for each unit cluster for India's SME's, an evaluation group would be constituted from experts from aluminum die casting industry, industry associations, furnace designers' etc. This evaluation group apart form recommending most optimal technology, will also analyze, with regards to time frame, the financial parameters associated with implementation of the project and estimate changes in technology and environmental baselines, if project is implemented.

In addition to this, the evaluation group will assess the endogenous building capacity of various vendors for supply & manufacture of equipment to sustain technology upgradation in these units alongwith recommendations on available financial mechanisms to support implementation of the project. The dissemination of information and creating awareness on the technology upgradation benefits through workshops and seminars would also be undertaken with help of industry associations.

Description of proposed PDF activities to meet the objectives.

In line with the STAP's recommendations for removal of barriers to implementation of climate friendly & commercially viable technologies, the present proposal would identify barriers that inhibit adoption of energy efficient technologies and recommend most suitable, least cost commercially viable technology option available world wide to achieve improvements in energy utilization in aluminum die casting units, specific for each cluster.

Moreover, an assessment of incremental costs for removal of barriers and identification of the financing options is a step towards building endogenous capacity to sustain the adoption of energy efficient technology. Also, an improvement in public awareness through, demonstration & dissemination of technology upgradation benefits in seminars/ workshops is a measure to foster sustainability Details of the activities to be covered under DFR are given as under.

Activities to be covered under PDF

There are three phases proposed to be undertaken from the funds of PDF B

First Phase : Preparatory Phase involving

a) **Finalizing the project team.** As a first step towards starting of the project, Implementing agency along with Executing agency (PCRA) will identify

1) Core team among PCRA professionals, regionwise, for identification and collection of data from aluminum die casting units in each region where energy efficiency improvements can be undertaken. This would involve conducting energy audits also.

2) Suitable International Technical Consultants to

   a) suggest data (techno-economic) that need to be collected from these units ,facilitate analysis of the data and recommend energy efficient least cost commercially viable technology options available worldwide, along with their procedure for technology transfer indicating cost & timeframe involved therein.
   b) assess various financial parameters like payback period , ERR associated with each option
   c) analyze data for assessment of barriers which would come in the way of technology upgradation
   d) establish methodology and procedure for establishment of technological & environmental baselines for these units under study along with instrumentation support required therein
   e) establish technological and environmental baselines

3) Evaluation Expert Group to recommend most optimal, energy efficient, commercially viable, technology suitable for each cluster in SME's. This group would be constituted from experts from aluminum die casting industry, industry associations, furnace designers etc. to

   a) Recommend most optimal, energy efficient, commercially viable, technology suitable for each cluster in SME's
   b) Evaluate, with regards to time frame, the financial parameters like payback period, ERR etc. associated with implementation of technology upgradation options given by technical consultants
   c) Estimate changes in technology and environmental baselines, if project is implemented.

    d) Assess the endogenous building capacity of various vendors for supply & manufacture of equipment to sustain technology upgradation in these units. Recommend ways for removal of barriers that would come in the way of project implementation
    e) Recommend financial mechanisms to support implementation of the project.

b) **Identification & collection of data from identified units** Based on the inputs given by technical consultants on requirements of data (in prescribed format) to establish technological & environmental baselines, data shall be collected from identified aluminum die casting units by the core team of PCRA officials.
c) **Seminar / workshop on introduction of the project.** As a first step towards spreading awareness among aluminum die casting units in SME's about the objectives of the projects and benefits it shall give when implemented, these seminars / workshops will serve as a kick off meetings. These seminars will be organized in each aluminum die casting unit cluster by PCRA with help of industry associations.
d) **Establishment of Procedure for Monitoring Progress.** Implementing agency along with PCRA will establish time schedule and procedures for monitoring progress on various activities of DFR.

Second Phase: Analysis of Data for Identification of Technology & Barriers

Technical consultants will

a) Analyze the data generated in Phase I for identification of technology gaps and recommend energy efficient least cost commercially viable technology options available worldwide
b) Assess various financial parameters like payback period, ERR associated with each option
c) Establish the existing technological & environmental baselines in each cluster for units under study
d) Analyze data for assessment of barriers, which would come in the way of technology upgradation

e) Assess the endogenous building capacity of various vendors for supply & manufacture of equipment to sustain technology upgradation

Third Phase: Assessment / Recommendation Phase:

This phase would involve estimation of the incremental costs for barrier removal, involving following activities

a) Technical Consultants will make presentation to Evaluation Group on Techno economic feasibility of each technology upgradation options.

b) Jointly, Technical Consultants and Evaluation Group will

i. Asses the suitability and commercial viability of technology upgradation options and recommend the most appropriate technology for units in each cluster
ii Asses the suitability, adoptability of each option with regards to endogenous capacities of the vendors for supply and manufacture of equipment for fostering sustainability of the technology upgradation.
iii. Recommend the number of units for which project implementation could be undertaken along with estimates of per unit cost and time required for implementation
iv. Recommend the financial mechanism options available for financing the implementation of the project.
v. Estimate the changes in technological & environmental baselines once the project is implemented.
vi. Estimate the cost of removal of barriers to implementation of the project.
vii. Recommend the procedure for transfer of technology and indicate the costs and timeframe involved therein.
viii. Recommend the institutional networking required for implementation of the project.
ix. Recommend procedures for evaluation of programmatic benefits of the technology upgradation project anticipating implementation.

c) **Demonstration and disseminating technology upgradation benefits through seminars and workshops** to other units in & around the clusters. To increase awareness among aluminum die casting units on benefits of upgraded energy efficient technologies. PCRA and training institutes having expertise in the field will develop structured awareness campaigns /workshops to be conducted jointly.

d) **Preparation of final report and presentation of findings to implementing agency** . Technical Consultants will make presentations to the implementing agency and submit DFR report giving recommendations for implementation phase.

Eligibility

The project is eligible for funding under the proposed Operational program # 6&7 of the GEF Operational Strategy related to removing barriers to energy conservation and energy efficiency and reducing the long term costs of low green house gas emitting energy technologies respectively. Also in line with the operational program, the project will cover the following:

- Assess the economic scope for energy conservation and energy -efficient technologies and programs whose implementation is blocked by barriers
- Estimate the contribution that such projects would make to reducing green house gases
- Identify all barriers , particularly energy pricing distortions
- Propose specific measures to remove barriers
- estimate the cost of barrier removal
- Estimate the financial requirements and time horizon for implementation
- Determine how programmatic benefits can be evaluated and monitored.

Further, India is eligible for assistance from GEF, having ratified the Framework Convention on Climate Change on November 1, 1993 and the proposed objectives of the project cover all the necessary requirements of the GEF operational program.

Justification for PDF grant.

A PDF grant is necessary to undertake activities related to ensuring that a strong GEF proposal is prepared which is fully consistent with the GEF Operational Strategy for climate change. PDF funding is necessary to identify fully the barriers: analyze how they can be removed. undertake surveys; obtain the involvement of the industry associations in private sector and government agencies; and determine financial sustainability and consumer acceptance. It would also ensure that a large number of stakeholders are consulted and included in the project and their feedback is incorporated into the project's design.

The institutional arrangements for the implementation of the project will be clarified through PDF work. Thus, the development of the implementation phase of the technology upgradation project in aluminum die casting units in SME's will be guided and determined by the outcome of PDF activities of the present proposal.

Special Features

- The project proposal is based on the energy use studies carried out by PCRA in SME's , which have a significant potential to save energy through technology upgradation leading to reduction in GHG emission. This project will help resource (financial & knowledge) constrained SME's to improve efficiency in aluminum die casting units which shall not be possible otherwise.
- The dissemination factor for the project is very high, as institutional approach has been adopted involving industry associations.
- The technology recommendations will be region specific at least costs. This will ensure easy replication and faster assimilation of efficient technology in each region. Thus fostering sustainability.
- The workshops/ seminars / training of both aluminum die casting unit workers and managers will ensure a clear-cut understanding and involvement of SME's at grass root level, leading to easier implementation and improved sustainability.

Budget

For the proposed project a PDF grant of US $ 3,48,500 has been requested. Details given as **Annex I**

Duration

One year from date of receipt of funds. Activity wise breakup given at **Annex II**

PDF Outputs Expected

1. Generation of data base on energy use pattern and technology & environmental baselines in aluminum die casting units in four clusters.

2. Identification of financial and technological barriers to the acceptance of efficient technologies in SME's.

3. Identification of commercially viable least cost technology options specific for each region.

4. Increasing awareness, involvement and commitment of SME's towards efficient utilisation of energy and reduction in GHG.

5. Identification of investment and financing options for removal of barriers, adoption of energy efficient technologies, demonstration and disseminating benefits of efficient technologies with respect to time horizon.

6. Final report on findings of the PDF B project with recommendations for implementation phase including how programmatic benefits can be evaluated and monitored during implementation phase.

Annex – I

BUDGET

Country : **India**

Project Title : **Catalyzing Energy Conservation at Small & Medium Enterprises (SME) in India's Aluminum die casting Industry**

Sl. No.	Project Component	USD	Amount
1.	Identification of mills / collection of data from units in four clusters (includes boarding/ lodging/ travel).	200 mills @ 150 US$/mill	30,000 USD
2.	**A. Evaluation Expert Group :**		
	i) Evaluation Committee Experts (6 nos./15 days/@300 USD/day	Includes Consultation / diem allowances	27,000 USD
	ii) Boarding lodging/ Travel 6 x 15 x 150 US$/day		13,500 USD
3.	**B. Technical Consultants:**		
	i) Fee for Tech./ Fin. Options Recommendation	4 (Clust.) x 28 (days) x 500 USD (fee/day)	56,000 USD
	ii) Visits/Travel – International	8 (Pers.) x 1 (trips) x 1500 USD/trip(PCRA) + 6 (Pers.) x 2 (trips) x 1500 USD/trip(Consl)	30,000 USD
	iii) Per Diem allowances @ USD 300/day	20 (Pers) x 7 (Days)	42,000 USD
	iv) Visits to mills for assessment of technology/ operational parameters	60 mills @ 150 US$/mill	9,000 USD
4.	Training/Seminars/Disseminating Information	4 (clust) x 2 (pre/post) 15000 USD	1,20,000 USD
5.	Preparing / Analysis Cost		10,000 USD
6	Project Support Services (MISL)		11,000 USD
TOTAL			**3,48,500 USD**

@ Rs 39.00 / USD = Rs 1,35,75,900

Annexure-II

ACTIVITY WISE CHART

Sl. No.	ACTIVITY (Phase-wise)	Months											
		1	2	3	4	5	6	7	8	9	10	11	12
A.	**Phase-I**	↔	↔	↔	↔	↔	↔						
a.	Finalizing the Project Team	↔											
b.	Identification & Collection of Data from Identified Mills		↔	↔	↔	↔	↔						
c.	Seminar / Workshop on Project Introduction	↔	↔										
d.	Establishment of Monitoring Procedure for DFR Activities		↔										
B.	**Phase-II** **Analysis of Data for Identification of Technology & Barriers**			↔	↔	↔	↔	↔	↔				
a.	Analysis of Data generated in Phase I			↔	↔								
b.	Assessment of Financial Parameters for each Option				↔								

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<tr><th>Sl. No.</th><th>ACTIVITY (Phase-wise)</th><th colspan="12">Months</th></tr>
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<tr><td>c.</td><td>Establishment of Technological & Environmental Baselines</td><td></td><td></td><td></td><td colspan="3">↔</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>d.</td><td>Assessment of Barriers</td><td></td><td></td><td colspan="3">↔</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>e.</td><td>Assessment of Endogenous Building Capacity of Vendors</td><td></td><td></td><td colspan="6">↔</td><td></td><td></td><td></td><td></td></tr>
<tr><td>C.</td><td>Phase-III
Assessment
Recommendation Phase</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="5">↔</td></tr>
<tr><td>a.</td><td>Presentations of Technology Options by Technical Consultants to Evaluation Group</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>↔</td><td></td><td></td><td></td><td></td></tr>
<tr><td>b.</td><td>Joint Recommendations of Technical Consultants & Evaluation Group</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="3">↔</td><td></td></tr>
<tr><td>c.</td><td>Seminar/Workshop on Technology Upgradation Benefits</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="2">↔</td><td></td></tr>
<tr><td>d.</td><td>Preparation of Final Report & Presentation of findings to Implementing Agency</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>↔</td></tr>
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